

The British Journal Photographic Almanac, 1901. Edited by Thomas Bedding. Pp. 1552. (London: Henry Greenwood and Co., 1900).

THE fourth annual issue of this photographic almanac seems to be as popular as ever, judging by the great amount of matter contained in the present volume. There are no less than 1552 pages, about 500 of which form the text. The arrangement of the book is the same as that adopted last year. There are over eighty articles on practical subjects, written by photographers, and these contain many useful hints which should be of service to those who utilise the experience of others. The "epitome of progress of the year," compiled by the editor, is very interesting reading, references to the most important advances being liberally made. "Recent novelties in apparatus" and "practical notes and suggestions of the year" also form no inconsiderable portion of the volume. The great collection of formulæ, tables, measures, photographic societies of the United Kingdom, &c., makes the volume a necessary accessory to any photographic studio.

Among the mass of material will be found some excellent illustrations, the frontispiece being a bromide print by Messrs. Morgan and Kidd. Not the least useful portion of this volume is the great collection of advertisements of most of the photographic manufacturers and dealers. The volume is quite up to, if it does not exceed, the standard of last year, and should be in the possession of all photographers. The price of one shilling brings it within the reach of all.

The Lead Storage Battery. By Desmond G. Fitz-Gerald. Pp. xi + 383. (London: Biggs and Co., no date.)

IN spite of the great industrial application of the accumulator, the theory of its working is in a very unsatisfactory state; and, moreover, those who desire to obtain information on the subject are obliged to seek for it in the publications of scientific institutions. Mr. Fitz-Gerald's book is a very useful summary of the leading facts and theories of the subject. Whilst fulfilling in some respects the objects of a text-book, it is much more than a text-book. Mr. Fitz-Gerald is able to speak with authority on both the chemical and electrical aspects of the storage cell, and his criticisms of existing types and suggestions of possible improvements will be found in many cases very valuable indications of what are likely to prove profitable lines of research. At the same time the book should be in the hands of any one who has to deal with accumulators, especially electrical engineers, who too often are quite ignorant of the chemistry of the subject. Besides discussing the various theories of the accumulator, the author gives an interesting account of its development, and descriptions, which are, we are inclined to think, too brief, of the different types of cell in use.

Mr. Fitz-Gerald apologises in the preface to the book for its possessing the defects of a compilation from notes made from time to time. It would have been better if, instead of making this apology, the author had removed the defects and had made the book a more consecutive work. It is difficult to make out to whom the book is intended to appeal, as in some instances elaborate calculations are entered into on points so elementary as to be quite childish, whilst in others a knowledge of chemistry is assumed which we doubt if the average electro-chemist possesses and feel sure is not possessed by the majority of electricians. In addition, the parts devoted to the history and theory of the subject respectively are inter-mixed without any apparent reason, and lose greatly in continuity and clearness in consequence. These defects are the more to be deplored as it is to be feared that they will discourage many from reading the book.

The Elements of Inorganic Chemistry. For Use in Schools and Colleges. By W. A. Shenstone, F.R.S. Pp. xii + 506. (London: Edward Arnold, 1900.)

THE object of the author of this elementary text-book is clearly stated in his preface. He says:—

"I have endeavoured to provide a book which begins with a course of experimental work for quite young students, and develops at the later stages into a text-book suitable for those who are older—that is, into a text-book containing fewer facts than those written solely for senior students, and in which the powers of young workers are more carefully kept in view in the earlier and middle parts than is necessary in the case of books written for students of a different type."

The book is divided into five parts. Part i. is chiefly taken up with the study of water and air, as exemplifying some of the principal types of chemical action and physical properties; Part ii. treats of the laws of combination and the atomic theory; Part iii. of the non-metals and their principal compounds; Part iv. of chemical affinity, heat changes, electrolysis, spectrum analysis and crystallography; Part v. of the metals and their chief compounds.

Directions are given for the performance of several hundreds of experiments, most of which can be done by the student himself. These directions, like the diagrams of apparatus which illustrate them, are very simple and clear.

The book seems extremely well adapted to the wants of the class of students the author has in view. Any youth of ordinary intelligence who works through the volume under the supervision of a competent demonstrator will acquire, not only an adequate knowledge of the facts of chemistry, but also sufficient theory to enable him to range and systematise these facts and to understand their general bearing.

The Thompson-Yates Laboratories Report. Edited by Profs. R. Boyce and C. S. Sherrington. Vol. i., Reprints, 1898-99; Vol. ii., Reprints and Reports, 1898-99; Vol. iii., Part 1, 1900. (Liverpool: University Press.)

THESE three handsome volumes testify to the energy and vitality of the Liverpool school. After a preliminary account of the laboratories founded by the munificence of the Rev. Thompson-Yates, vol. i. is devoted to neurology, and contains papers and reprints by Profs. Sherrington and Boyce, and Drs. Warrington, Laslett and Grünbaum, of which the one by the first-named author, upon the peripheral distribution of some spinal nerves, forms the *pièce de résistance*, occupying more than half the book. There are also interesting papers upon the changes found in lead paralysis and upon the muscle-spindles in pseudo-hypertrophic paralysis. In the latter, Grünbaum considers that his observations support the theory that this disease is a primary one of the muscles.

The first half of vol. ii. contains papers and reprints in bacteriology, hygiene and morbid anatomy, of which Dr. Balfour Stewart contributes three on plague—its diagnosis, and on the active constituents of Haffkine's prophylactic, Dr. Annett an interesting *résumé* of the tubercle-like bacilli in butter, and the same author an experimental inquiry on the use of boric acid and formaline as milk preservatives, in which he shows that kittens fed on milk containing these two substances are injuriously affected. The account of the morbid anatomy and pathology of a case of myelopathic albumosuria, by Drs. Bradshaw and Warrington, is a valuable contribution to our knowledge of this very rare disease, which was first described by Bence Jones, and of which only seven other cases have been recorded. Next follow the reports of the various departments and, as a supplement, Profs. Boyce and Herdman's report on oysters and disease, and the report of the Malarial Expedition to West Africa.

Vol. iii. is similarly mainly bacteriological. Balfour Stewart shows the wide distribution of the *Bacillus enteritidis sporogenes* of Klein, MacConkey contributes a paper on the differentiation and isolation of the *Bacillus coli* and *Bacillus typhosus* from mixtures by means of media containing bile salts.

The printing, illustrations and general "get-up" of the volumes are excellent. There is, perhaps, a tendency to needless detail in some places, as, for example, in the list of milk samples, but many of the papers are contributions of real scientific value.

Einführung in die Stöchiometrie. Von Joachim Biehlinger. Pp. xviii + 498. (Brunswick: F. Vieweg und Sohn, 1900.)

THIS book, which differs greatly from the ordinary textbooks of chemistry, has for sub-title "A study of the quantitative composition of substances and the properties connected therewith." So far as subject-matter is concerned, it covers much the same ground as Part i. of Ostwald's *Allgemeine Chemie*, the general arrangement evidently being inspired by that work. The treatment, however, is radically different, theoretical matters, although adequately outlined, being made subservient to their practical applications, which are illustrated by a wealth of numerical examples. The arithmetical exercises are, in fact, the chief feature of the book. There are altogether three hundred of them, each of which is provided with a fully-worked solution, the method of calculation being carefully explained. The problems are well-selected, unpedantic, and of real value in their application to laboratory or technical work. Some are, perhaps, a little far-fetched, but even these are instructive, and almost always possess some human interest. For example: "It is desired to convert into sparkling wine 1000 litres of new wine containing 10 per cent. by volume of alcohol and 0.5 per cent. of unfermented sugar. How much cane-sugar must be added in order that after fermentation the wine may have a pressure of 5 atmospheres, the temperature of the cellar being 12°?" The student will be especially grateful for the numerous examples of the calculation of molecular weights, and of the results of analysis, both gravimetric and volumetric. Altogether no better guide could be desired to chemical and elementary physico-chemical calculations.

Travail des Metaux dérivés du Fer. Par L. Gages, Capitaine d'Artillerie. "Encyclopédie Scientifique des Aide-Memoire." Pp. 202; 40 illustrations. (Paris: Gauthier-Villars, 1900.) Price 2 fr. 50 centimes.

THIS new member of the excellent *aide-memoire* series worthily upholds the reputation built up by its predecessors. It gives in clear, terse language a short summary of the mechanical and thermal treatment to which steel is subjected to prepare it for use in the industries, and the greater part of the remainder of the book is given up to considerations of the theory of hardening and tempering. The solution theory of the constitution of steel is so firmly established in France that it is now taken as an authoritative explanation of the facts; but some of the thermal and micrographic evidence is given, on which the theory is based. In dealing with "steels" which owe their distinctive properties to the admixture with iron of elements other than carbon, Captain Gages makes a new departure in classifying them in accordance with a law enunciated by Sir William Roberts-Austen, which sets forth the fact that elements having a lower atomic volume than iron tend to harden steel, and those with a higher atomic volume to soften it and make it malleable. This classification of a large class of materials which are comparatively new to engineers seems useful and businesslike, and, indeed, Captain Gages, by bringing into a brief and readable form the results of the labours of Osmond, Werth and many others, has done much to popularise the whole subject.

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LETTERS TO THE EDITOR.

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The Stability of a Swarm of Meteorites.

REFERRING to my paper in NATURE of October 11, "On the Stability of a Swarm of Meteorites, &c.," Mr. R. B. Hayward, F.R.S., has called my attention to the fact that the supposition, made near the foot of the first column, that

$$\xi = a \cos \omega t, \quad \eta = b \sin \omega t,$$

in other words that the relative orbit of the particle under consideration is an ellipse of semi-axes a , b , involves an eccentricity,

$$\sqrt{1 - b^2/a^2},$$

for that ellipse of amount

$$n \sqrt{3/(\mu - \omega^2)} = \sqrt{6n/(\sqrt{n^2 + 16\mu - n})},$$

so that in strictness the relative orbit cannot be a circle unless $n=0$.

This point ought, perhaps, to have been brought out in my paper as illustrating the rudeness of the approximation of the shape of the swarm to a sphere in any actual case, a matter which I touched on in speaking of the inutility of further refinements, such as the effect of the ellipticity of the swarm's orbit round the sun. However, for any probable swarm in the solar system, n^2/μ must be a very small fraction, and so ω^2 may be very nearly equal to μ (if the centre of the swarm is fixed, $\mu = \omega^2$), while b/a is nearly unity.

Mr. Hayward suggests that the same difficulty may have been felt by others, and that therefore the above explanation may be desirable.

ANDREW GRAY.

The University, Glasgow, December 29, 1900.

An Artificial Representation of a Total Solar Eclipse.

IN preparing for polarisation experiments on the solar corona, it is extremely desirable to have an artificial corona as nearly as possible resembling the reality for preliminary work. The only device of the kind that has been used to my knowledge was the arrangement described by Wright in his eclipse report, consisting of a cardboard funnel, lined with black cloth, with a light at the back. This gives a ring-shaped illuminated area radially polarised. It is believed that the contrivance about to be described will be found far better adapted to work of this sort, for the artificial corona in this case resembles the real so closely as to startle one who has actually witnessed a total solar eclipse. The polarisation is radial, and is produced in the same way as in the sun's surroundings, and the misty gradations of brilliancy are present as well. So perfect was the representation that I added several features of purely æsthetic nature to heighten the effect, and finally succeeded in getting a reproduction of a solar eclipse which could hardly be distinguished from the reality, except that the polar streamers are straight, as drawn by Trouvelot, instead of being curved, as all the recent photographs show them. The curious greenish-blue colour of the sky, and the peculiar pearly lustre and misty appearance are faithfully reproduced. For lecture purposes an artificial eclipse of this sort would be admirably adapted, and I know of no other way in which an audience could be given so vivid an idea of the beauty of the phenomenon. Drawings and photographs are wholly inadequate in giving any notion of the actual appearance of the sun's surroundings, and I feel sure that any one will feel amply repaid for the small amount of trouble necessary in fitting up the arrangement which I shall describe.

A rectangular glass tank about a foot square on the front and five or six inches wide, and a six candle-power incandescent lamp are all that are necessary. The dimensions of the tank are not of much importance, a small aquarium being admirably adapted to the purpose. The tank should be nearly filled with clean water, and a spoonful or two of an alcoholic solution of mastic added. The mastic is at once thrown down as an exceedingly fine precipitate, giving the water a milky appearance. The wires leading to the lamp should be passed through a short glass tube, and the lamp fastened to the end of the tube with sealing wax, taking care to make a tight joint to prevent